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months have a continual jumping movement. The shrub is small, from four to six feet in height, branchy, and in the months of June and July yields the seeds, a pod containing from three to five seeds. These seeds have each a little worm inside. The leaf of the plant is very similar to that of the 'garambullo,' the only difference being in the size, this being a little larger. It is half an inch in length and a quarter of an inch in width, a little more or less. The bark of the shrub is ash-colored, and the leaf is perfectly green during all the seasons. By merely stirring coffee or any drink with a small branch of it, it acts as an active cathartic. Taken in large doses it is an active poison, speedily causing death unless counteracted by an antidote."

Mr. Riley stated that the seed of *Tamariscus* was known to be moved by a Coleopterous larva (*Nanodes tamarisci*) that fed within it; and he concluded by describing and exhibiting a still more wonderful jumping property in a seed-like body which may be observed in our own woods. It is a little spherical, seed-like gall produced in large numbers on the under side of the post and other oaks of the white-oak group. This gall drops in large quantities to the ground, and the insect within can make it bound twenty times its own length, the ground under an infested tree being sometimes fairly alive with the mysterious moving bodies. The noise made often resembles the pattering of rain. The motion is imparted by the insect in the pupa and not in the larva state. Mr. Riley presented a description of the gall, which may be known by the name of *Quercus saltatorius*, the black fly which issues from it having been described as *Cynips saltatorius* by Mr. H. Edwards, of San Francisco.

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THE PROGRESS OF DISCOVERY OF THE LAWS OF EVOLUTION.

AT a recent meeting of the Academy of Natural Sciences of Philadelphia, Professor Cope made some remarks on the progress of discovery of the laws of evolution, of which the following is a synopsis: —

He remarked that while Darwin has been its prominent advocate within the last few years, it was first presented to the scientific world in a rational form by Lamarck, of Paris, at the commencement of the present century. Owing to the adverse influence of Cuvier, the doctrine remained dormant for half a century, and Darwin resuscitated it, making important additions at the same time. Thus Lamarck found the variations of species to be primary evidence of evolution by descent. Darwin enunciated the law of "natural selection" as a result of the struggle for existence, in accordance with which "the fittest only survive." This law, now generally accepted, is Darwin's principal contribution to the doctrine. It, however, has a secondary position in relation to the *origin* of variation, which Lamarck saw, but did not account for, and which Darwin has to assume in order to have materials from which a "natural selection" can be made.

The relations exhibited by fully grown animals and plants with transitional or embryonic stages of other animals and plants had attracted the attention of anatomists at the time of Lamarck. Some naturalists deduced from this now universally observed phenomenon that the lower types of animals were merely repressed conditions of the higher, or, in other words, were embryonic stages become permanent. But the resemblance does not usually extend to the entire organism, and the parallels are so incomplete that this view of the matter was clearly defective, and did not constitute an explanation. Some embryologists, as Lereboullet and Agassiz, asserted that no argument for a doctrine of descent could be drawn from such facts.

The speaker, not adopting either view, made a full investigation into the later embryonic stages, chiefly of the skeleton of the batrachia, in 1865, and Professor Hyatt, of Salem, Mass., at the same time made similar studies in the development of the ammonites and nautili. The results, as bearing on the doctrine of evolution, were published in 1869 in a paper entitled The Origin of Genera. (Proceedings of the Philadelphia Academy of Natural Sciences.) The relation usually observed between adult types and transitional stages was there termed *inexact parallelism.* It was then pointed out that the most nearly related forms of animals do present a relation of repression and advance, or of permanent embryonic and adult type, leaving no doubt that the one descended from the other. This relation was termed *exact parallelism.* It was also shown that if the embryonic form were the parent, the advanced descendant was produced by an increased rate of growth, which phenomenon was called *acceleration ;* but that if the embryonic type were the offspring, then its failure to attain to the condition of the parent is due to the supervention of a slower rate of growth. To this phenomenon the term *retardation* was applied. It was then shown that the inexact parallelism is the result of unequal acceleration or retardation;

that is, acceleration affecting one organ or part more than another, thus disturbing the combination of characters which is necessary for the state of *exact parallelism* between the perfect stage of one animal and the transitional stages of another. Moreover, acceleration implies constant addition to the parts of an animal, while retardation implies continual subtraction from its characters, or atrophy. The speaker had also shown (Method of Creation, 1871) that the additions appeared either as *exact repetitions* of preëxistent parts, or as *modified repetitions*, the former resulting in simple, the latter in complex organisms.

Professor Haeckel, of Jena, has added the key-stone to the doctrine of evolution in his gastræa theory. Prior to this generalization, it had been impossible to determine the true relation existing between the four types of embryonic growth, or to speak otherwise than to the effect that they are inherently distinct from each other. But Haeckel has happily determined the existence of identical stages of growth or segmentation in all the types of eggs, the last of which is the gastrula, and beyond which the identity ceases. Not that the four types of gastrula are without difference, but this difference may be accounted for on plain principles. In 1874, Haeckel, in his Anthropogenie, recognized the importance of the irregularity of time of appearance of the different characters of animals during the period of growth, as affecting their permanent structure. While maintaining the view that the low forms represent the transitional stages of the higher, he proceeds to account for the want of exact correspondence exhibited by them at the present time by reference to this principle. He believes that the relation of parent and descendant has been concealed and changed by subsequent modification of the order of appearance of characters in growth. To the original, simple descent, he applies the term *palingenesis;* to the modified or later growth, *cœnogenesis.* The causes of the change from palingenesis to cœnogenesis he regards as three, namely, acceleration, retardation, and heterotopy.

It is clear that the two types of growth distinguished by Professor Haeckel are those which had been pointed out by the speaker, in The Origin of Genera, as producing the relations of exact and inexact parallelism, and that his explanation of the origin of the latter relation by acceleration or retardation is the same as that of the latter essay. The importance which Haeckel attaches to the subject was a source of gratification to the speaker, as it was a similar impression that led to the publication of The Origin of Genera in 1869.

It remains to observe that the phenomena of exact parallelism, or palingenesis, are quite as necessarily accounted for on the principle of acceleration or retardation as are those of inexact parallelism, or cœnogenesis. Were all parts of the organism accelerated or retarded at a like rate, the relation of exact parallelism would never be disturbed, while the inexactitude of the parallelism will depend on the number of variations in the rate of growth of different organs of the individual, with additions introduced from time to time. Hence it may be laid down that synchronous acceleration or retardation produces exact parallelism, and heterochronous acceleration or retardation produces inexact parallelism.

In conclusion, it may be added that acceleration of the segmentation of the protoplasma or animal portion of the primordial egg, or retardation of segmentation of the deutoplasma or vegetative half of the egg, or both, or the same relation between the growth of the circumference and centre of the egg, has given rise to the four types which the segmentation now presents. This analysis of the laws of evolution was tabulated as follows: —

		Exact parallelism produced by *palingenesis*, which is synchronous	*Inexact parallelism* produced by *cœnogenesis*, which is heterochronous
acceleration, which proceeds by	Exact repetition.	*	*
	Modified repetition.	*	*
	Heterotopy.	*	*
retardation, which proceeds by	Exact atrophy.	*	*
	Modified atrophy.	*	*

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THE FLORA OF GUADALUPE ISLAND, LOWER CALIFORNIA.[1]

BY SERENO WATSON.

THE island of Guadalupe is in latitude twenty-nine degrees north, about one hundred miles from the coast of Lower California, and two hundred and thirty west of south from the town of San Diego, which is near the southern line of California. It is twenty-six miles in length in a north and south direction, with an average breadth of ten miles, and is traversed by a mountain ridge, the central peak (Mount Augusta) having an

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[1] Extract from the Proceedings of the American Academy of Arts and Sciences, vol. xi.